

REMARKS

Claims 1, 3, 5 and 7-16 remain pending in the present application, with 1, 3, 5 and 14-15 standing ready for further action on the merits, and remaining claims 7-13 and 16 being withdrawn from consideration, due to an earlier restriction requirement of the USPTO. No amendments to the claims are presented in the present response.

In view of the following remarks, Applicants respectfully request that the USPTO withdraw all rejections all rejection of record, and allow the currently pending claims 1, 3, 5 and 14-15 currently under consideration.

Claim Rejection under 35 U.S.C. § 103(a)

Claims 1, 3, 5 and 14-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over **Lange et al. US'333** (US 4,816,333) in view of **Takahashi et al. US'523** (US 6,251,523). Reconsideration and withdraw of the outstanding rejection is respectfully requested based on the following considerations.

Legal Standard for Determining Prima Facie Obviousness

M.P.E.P. § 2141 sets forth the guidelines in determining obviousness. First, the USPTO has to take into account the factual inquiries set forth in *Graham v. John Deere*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), which has provided the controlling framework for an obviousness analysis. The four *Graham* factors are:

- (a) determining the scope and content of the prior art;
- (b) ascertaining the differences between the prior art and the claims in issue;
- (c) resolving the level of ordinary skill in the pertinent art; and
- (d) evaluating any evidence of secondary considerations.

Graham v. John Deere, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

Second, the USPTO has to provide some rationale for determining obviousness. MPEP § 2143 sets forth some rationales that were established in the recent decision of *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). Exemplary rationales that may support a conclusion of obviousness include:

- (a) *combining prior art elements according to known methods to yield predictable results;*
- (b) *simple substitution of one known element for another to obtain predictable results;*
- (c) *use of known technique to improve similar devices (methods, or products) in the same way;*
- (d) *applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;*
- (e) *"obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success*
- (f) *known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;*
- (g) *some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.*

As the M.P.E.P. directs, all claim limitations must be considered in view of the cited prior art in order to establish a *prima facie* case of obviousness. See M.P.E.P. § 2143.03.

Distinctions Over the Cited Art

In the outstanding Office Action dated December 17, 2009, the USPTO has maintained the outstanding rejection of the claims of the present application as being obvious over **Lange et al. US'333** in view of **Takahashi et al. US'523**. The USPTO did not find that the Applicants' arguments in the reply dated December 3, 2009 are persuasive. As to the Applicants' argument concerning the importance of formula (1) recited in claim 1 of the present application, the USPTO states that, since the collective teachings of prior art render the general structure, composition, and process of making of the claimed invention obvious, the structural relationships expressed in formula (1) are deemed to be obvious routine optimization to one skilled in the art, motivated by the desire to obtain the required properties for the same end used as the claimed invention.

However, Applicants consider that the USPTO's reasoning is based on a hindsight analysis. It should be reminded that **Takahashi et al. US'523** has no teaching or suggestion that "the required properties for the same end used as the claimed invention" can be obtained by "the structural relationships expressed in formula (1)"; therefore, it cannot be said that "the structural relationships expressed in formula (1)" are "obvious routine optimization" since **Takahashi et al. US'523** lacks clear pointer to such a structural relationship.

The present application has as many as 21 Examples in which the laminated structures of the present invention are obtained. Particularly, in conjunction with the difference from **Takahashi et al. US'523**, it should particularly be noted that, in all of the Examples of the present application, the laminated structures of the present invention are produced under conditions wherein the hydrolysis and dehydration-condensation of silane prior to mixing with monoliform silica strings is avoided in the preparation of a coating composition for forming the

porous silica layer (detailed explanation on this point is made later referring to Comparative Examples 2 and 3) and the heating of the coating composition is suppressed as much as possible (120 °C for 2 minutes in all of the Examples of the present application).

On the other hand, in all of the Examples of **Takahashi et al. US'523**, laminated structures are produced under conditions where, in addition to the very high temperature heating of the coating composition (100 °C for 30 minutes, 250 °C for 30 minutes and, then, 500 °C for 1 hour) as pointed out in the Applicants' previous responses, the hydrolysis and dehydration-condensation of silane is carried out prior to mixing with monoliform silica strings, thereby resulting in structures totally different from that of the present invention.

Further, neither **Lange et al. US'333** nor **Takahashi et al. US'523** has any teaching or suggestion about the structural relationships expressed by formula (1) recited in claim 1 of the present application. Thus, in order to arrive at the present invention starting from **Lange et al. US'333** in view of **Takahashi et al. US'523**, those skilled in the art would have to select appropriate materials and heating conditions from wide ranges described in **Takahashi et al. US'523** so as to form a structure not taught or suggested in **Lange et al. US'333** nor **Takahashi et al. US'523**, which would certainly imposes an undue burden on a person of ordinary skill in the art.

Therefore, **Takahashi et al. US'523** does not enable a person of ordinary skill in the art to carry out the invention of the present application and, hence, cannot be said to satisfy the enablement required of a prior art reference in MPEP 2121. More detailed discussion on this point is made below.

The specification of the present application describes various conditions which are required for achieving the structural relationships expressed in formula (1) recited in claim 1.

The omission of a high temperature heating (*e.g.*, at 500 °C) is of course one of the most important factors for this purpose but is not a single factor which alone leads to the present invention starting from the disclosure of **Takahashi et al. US'523**. In this respect, the specification of the present application describes various conditions for obtaining the structure of the present invention (*see page 34, line 6 to page 66, line 14 of the instant specification*), *i.e.*, types of raw materials, methods of mixing raw materials, method for forming the porous silica layer, *etc.* In this connection, it should be noted that, in addition to the high temperature heating, the Examples of **Takahashi et al. US'523** do not satisfy the very important condition regarding the preparation of a coating composition used for forming the porous silica layer. That is, as described in claim 1 of the present application, the coating composition used for forming the porous silica layer in the structure of the present invention is prepared by a method in which a mixture of moniliform silica strings and a hydrolyzable group-containing silane is subjected to hydrolysis and dehydration-condensation.

On the other hand, when a hydrolyzable group-containing silane is subjected to hydrolysis and dehydration-condensation prior to mixing thereof with moniliform silica strings (as in Comparative Examples 2 and 3 described at page 85, line 24 to page 88, line 8 of the present specification), the structure of the present invention cannot be obtained and the strength of the obtained laminated structure is disadvantageously low, as compared to the case where a hydrolyzable group-containing silane is subjected to hydrolysis and dehydration-condensation after mixing thereof with moniliform silica strings (as in Examples 5 to 9).

In the Examples of **Takahashi et al. US'523**, the coating composition is prepared by the same way as in the above-mentioned Comparative Examples 2 and 3 of the present application. Specifically, **Takahashi et al. US'523** has the following description:

“[First embodiment]

There is provided a mixture of 3.0 parts by weight of hydrolytic condensation polymerization liquid of ethyl silicate (trade name: HAS-10 made by Colcoat Co., SiO₂ content: 10% by weight), 13.3 parts by weight of chain silica colloid (trade name: Snowtex OUP made by Nissan Chemical Industry Co., Ltd. solid content 15% by weight, containing dispersion auxiliary) having an average diameter of about 15 nm and average length of about 170 nm, and 74.9 parts by weight of 2-propanol at room temperature, which is diluted with threefold parts by weight of 2-propanol and stirred at room temperature for 2 hours to obtain a coating solution for forming low refractive index dents and projections layer.” (col.8, lines 21 to 34) (Emphasis added)

Thus, in the “First embodiment” of **Takahashi et al. US’523**, the “chain silica colloid” (moniform silica strings) is mixed with the “hydrolytic condensation polymerization liquid of ethyl silicate”, which means that the hydrolyzable group-containing silane (ethyl silicate) is subjected to hydrolysis and dehydration-condensation prior to mixing thereof with moniform silica strings. Further, in all of the Examples of **Takahashi et al. US’523**, the coating composition is produced by the same method as in the “First embodiment”. As to “HAS-10” used in the Examples of **Takahashi et al. US’523**, this product is also referred to as “commercialized alkoxy silane hydrolyzed liquid” at col. 5, lines 26 to 27 of **Takahashi et al. US’523**, and the website of the manufacture of this product (http://www.colcoat.co.jp/e/_chemi/s_has10.html) has the following description (*see attached*):

“HAS-10 is a hydrolyzed solution of ethyl silicate under a catalyst of ethyl alcohol or isopropanol with an acidity kept at a low level. It is perfect as a binder agent for light electric investments. It can also be used as a coating agent for general molds such as flan and phenol-type resin molds.” (Emphasis added)

Thus, it is apparent that **Takahashi et al. US’523** does not recognize the importance of the preparation of the coating composition as recited in claim 1 of the present application.

Further, with respect to the heating conditions at the formation of the porous silica layer, the specification of the present application has descriptions about appropriate conditions (*see page 64, line 16 to page 65, line 17 of the present specification*). In all of the Examples of the present application, the heating of the coating composition applied to the substrate was carried out at a temperature as low as 120 °C for a time as short as 2 minutes (*see page 76, lines 1 to 4 of the instant specification*). This is in agreement with the teaching in the instant specification. That is, according to the description of the present specification, the curing temperature is most preferably “80 to 120 °C” (*see page 64, lines 16 to 21*) and the curing time is most preferably “within 15 minutes” (*see page 65, lines 16 to 17*).

On the other hand, in the Examples of **Takahashi et al. US'523**, the heating of the coating composition is carried out in accordance with the following heating profile: 100 °C for 30 minutes, 250 °C for 30 minutes and, then, 500 °C for 1 hour (*see col. 8, lines 47 to 50*). Further, even if the very high temperature heating (500 °C for 1 hour) should be omitted, **Takahashi et al. US'523** still suggests very wide ranges of heating conditions, *i.e.*, “the range of room temperature to 200° C. for 1 minute to 2 hours” (*see col. 7, lines 28 to 31*).

In addition, it should be noted that **Takahashi et al. US'523** at col. 8 describes only two types of heating conditions: *i.e.*,

“the range of room temperature to 200° C. for 1 minute to 2 hours”, and

“temperature between 400 °C. to 750 °C. for 5 seconds to 5 hours” (optionally carried out for improving the strength of the resultant silica film).

However, in the Examples of **Takahashi et al. US'523**, the heating at “250 °C for 30 minutes” is also carried out. Thus, as far as the heating conditions are concerned, all what can be

derived from **Takahashi et al. US'523** is that the heating is better done sufficiently in respect of temperature and time for improving the strength of the resulting silica film.

From the above, it is apparent:

that the structures actually obtained in the Examples of **Takahashi et al. US'523** are totally different from that of the present invention as apparent from the comparison between Example 21 and Comparative Example 6 of the present application as discussed in the Applicants' previous response,

that, needless to say, **Takahashi et al. US'523** has no teaching or suggestion about the structure which would result when the hydrolysis and dehydration-condensation of silane prior to mixing with monoliform silica strings and the high temperature heating are omitted from the Examples of **Takahashi et al. US'523**, and

that **Takahashi et al. US'523** merely broadly describes the materials and conditions for forming the porous silica layer and has no teaching or suggestion which directs a person of ordinary skill in the art to the materials and conditions which are suitable for obtaining the structure of the present invention.

Thus, a person of ordinary skill in the art cannot arrive at the present invention without undue experimentation even when the teaching of **Takahashi et al. US'523** is combined with the teaching of **Lange et al. US'333**. Further, it should be reminded that the advantage of the present invention over **Lange et al. US'333** was already shown in the earlier submitted **37 CFR § 1.312 Declaration of Mr. Nakatani** (*filed in the USPTO on February 27, 2008*).

Therefore, it is apparent that the laminated structure of the present application is not obvious over **Lange et al. US'333** even in view of **Takahashi et al. US'523**.

From the foregoing, it is firmly believed that the rejections of the claims have been overcome. In this regard, the cited art of record fails to provide those of ordinary skill in the art with any reason or rationale that would allow them to arrive at the instant invention as claimed. Accordingly, early and favorable action is respectfully solicited.

Provisional Examiner Interview Request

Should the instant reply not result in an allowance of each of pending claims 1, 3, 5 and 14-15 currently under consideration, the Examiner is respectfully requested to contact Mr. John W. Bailey (Reg. No. 32,881) in the Washington D.C. area at 703-205-8031, in order to schedule a personal interview at the Examiner's earliest convenience. It is submitted that such an interview would be valuable in helping to further prosecution of the instant application towards issuance of a Notice of Allowance, or alternatively, to further clarity and/or simplify outstanding issues for purposes of a future Appeal to the USPTO Board of Patent Appeals and Interferences.

CONCLUSION

Based upon the amendments and remarks presented herein, the Examiner is respectfully requested to issue a Notice of Allowance clearly indicating that each of the pending claims 1, 3, 5 and 14-15 under consideration at present is allowable under the provisions of Title 35 of the United States Code.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John W. Bailey, Reg. No. 32,881 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

Dated: June 16, 2010

Respectfully submitted,

By 

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Attachment: Copy of http://www.colcoat.co.jp/e/_chemi/s_has10.html (one page)

ProductsChemicals

Products - Chemicals

HAS-10

HAS-10 is a hydrolyzed solution of ethyl silicate under a catalyst of ethyl alcohol or isopropanol with an acidity kept at a low level. It is perfect as a binder agent for light electric investments. It can also be used as a coating agent for general molds such as flin and phenol-type resin molds.

 [HAS \(hydrolyzed ethyl silicate solution\)](#) [HAS-1](#) [HAS-6](#) [HAS-10](#)[TOP](#)